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RESEARCH PAPER

Attitudes Towards Biodiversity Conservation of Forests Dwellers and Encroachers: A Case Study of Assam in Northeast India

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Abstract By enacting the *Forest Rights Act 2006*, the Government of India aimed to protect the rights of the forest dwellers; at the same time, it sought to involve the forest dwellers in protecting the forests. But the forest dwellers are critical of this *Act*, on the ground that it does not consider tribal customary laws, which are essential to protect both the forests and the rights of the forest dwellers. This paper examines the perceptions and attitudes of the dwellers of village forest and encroachers towards biodiversity conservation under the rights enshrined in the *Forest Rights Act 2006*. A survey was conducted in190 households in four village forests and two encroached villages under reserved forests of Sonitpur and Golaghat districts of Assam in Northeast India. The majority of the respondents were found to have positive attitudes towards environmental issues in general and protection of biodiversity loss in particular. Village-type, residents' occupation, caste, source of fuel for cooking, educational qualifications and size of land holding were found to be significantly associated with attitudes towards biodiversity conservation. It is concluded that conducting an environmental education program and rights-holders' monitoring system on the impact of their use of forest resources will support conservation of biodiversity.

Keywords Forest Rights Act 2006 · Joint Forest Management · Gram Sabha · Sangha

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Introduction

Conservation of biodiversity is a part not only of sustainable development activity but also of the research and policy-making process initiated by world leaders in the United Nations Conference on Environment and Development (Brazil in 1992, Johannesburg in 2002 and proposed to be held in Brazil in June 2012) as well as by the Millennium Development Goals of the United Nations. Controlling the systematic erosion of biodiversity and meeting the needs of increasing human population at the same time, should be an important goal for the policy-making process in both developed and developing countries (Gadgil 1991; Rodgers 1991; Rawat 1997). Even if the global community is to perceive biodiversity conservation favourably and support conservation activities, it is ultimately the perceptions and attitudes of communities which reside within or near the forest areas and depend on forests for their livelihood that will make a difference to biodiversity conservation (Ninan et al. 2007). Various studies have shown links between attitudes of local people and conservation of nature (e.g. Heinen 1993; Newmark et al. 1993; Mehta and Kellert 1998; Walpole and Goodwin 2001; Sah and Heinen 2001). It is found that people have negative attitudes towards biodiversity conservation in their locality due to cost associated with conservation such as damage to crops and livestock by wildlife (Shyamsundar and Kramer 1997; Gillingham and Lee 1999), while the benefits from conservation-such as revenue from tourism, and licensed hunting of wildlife, and harvesting of game meat have some positive effects (Parry and Campbell 1992; Gillingham and Lee 1999; Walpole and Goodwin 2001).

Several studies have shown that poor people living inside forests or at forest margins are highly dependent on forests for their livelihood (e.g. Gunatilake 1996; Hedge et al. 1996; Kanth 1997; Bista and Webb 2006). In India, collection of non-timber forest products is reported to be highly important (Hegde and Enters 2000). With the rise in population, the volume of extraction (collection of firewood and fodder) has increased with resources depleting rapidly (Baland et al. 2006). Assam, one of India's north-east states, is famous for its jungles, flora and fauna; it has been facing a worse situation owing to large-scale extraction of forest products and simultaneous destruction of forests (Bora 2001; Kushwaha and Hazarika 2004; Tamuli and Choudhury 2009). In order to curb the huge illegal extraction, legislation has been introduced in Assam since the *Government Forest Act 1865* (GOA 2008). However, these Acts have focused mainly on 'policing' the forests without attempting to involve the people living around the forests (Bora 2001; Tamuli and Choudhury 2009). Conservation of forests without recognizing the rights of forests people led to conflict between the protected area management authority and neighbouring people (Heinen 1996; Straede and Helles 2000), and it has been argued that community-based conservation programs might be a viable solution for enhancing both conservation and development of local people (Gibson and Marks 1995; Heinen and Mehta 2000). Some studies have also revealed that such conflicts could be resolved by providing goods and services to people living near protected areas (Pearce and Moran 1995; Heinen and Mehta 1999). But providing short-term benefits to people by the protected area management authority at the expense of the long-term survival of the forest resources might not be a

practical solution for the management of conflict between people and protected area (Straede and Helles 2000).

The *Forest Rights Act* (*FRA*), known as *The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006* passed by the Parliament of India had dual aims of protecting the rights of the forests dwellers and securing the involvement of forests dwellers forest protection. The *FRA 2006* argued that to provide ownership of land to the forests dwellers could be a strong incentive for evolving sustainable land-use practices and conservation (Godoy et al. 1998; Deacon 1999). Moreover, the *FRA 2006* empowered the Gram Sabha[1] and other village-level institutions to protect wildlife, forests and biodiversity, and ensured that the habitat of forest-dwelling scheduled tribes along with other traditional forest dwellers was preserved from any form of destructive practices. However, tribal bodies were doubtful about the effectiveness of the *FRA 2006* in protecting the interests of the tribal people. Further, they feared that non-traditional forests dwellers, including immigrant settlers might take advantage of the *FRA 2006* to destroy forests. Tribal bodies were skeptical about the success of the *FRA 2006* because it did not take into account tribal customary laws which were essential for protecting both forests and tribal rights (Gadd 2005). The Government of Assam did not execute the *FRA 2006* except for distribution of land ownership in three or four villages on a trial basis.

The study of perceptions and attitudes of dwellers of village forests[2] and encroachers towards biodiversity conservation is important because assessment of such perceptions and attitudes can help policy-makers in the formulation and execution of conservation-related development projects that need support from forests dependent communities (Parry and Campbell 1992; Gillingham and Lee 1999). Specially, when implementation of the forest conservation program is through provision of rights to forestlands and products, success of the policy very much depends on the perceptions and attitudes of the target group. Therefore, the main objective of this study has been to assess the attitudes and perceptions of dwellers of village forests and encroachers in the state of Assam in Northeast India in the context of the *FRA 2006*, which had legal provision to provide rights of land to scheduled tribes and forests dwellers. The hypothesis to be tested is that dwellers of village forests and encroachers have positive attitudes towards biodiversity conservation. The next section describes the study area and research methods. The results are then presented and discussed, and policy implication drawn.

The Study Area

The study covered four village forests and two encroached villages (villages that are officially considered as encroached) of two districts of Assam in Northeast India,

[1] Gram Sabha means a village assembly which consists of all adult members including women of a village and in case of states having no panachayats, padas, tolas and other traditional village institutions and elected committees, with full and unrestricted participation of women (Government of India 2007).

[2] The three-fold classification of forests, as reserve, protected and village forest, were proposed in the Government of India's Forest Act of 1927-(Section 28). Village forests are to be managed through the village community and guidelines for such management have been laid down in the Act.

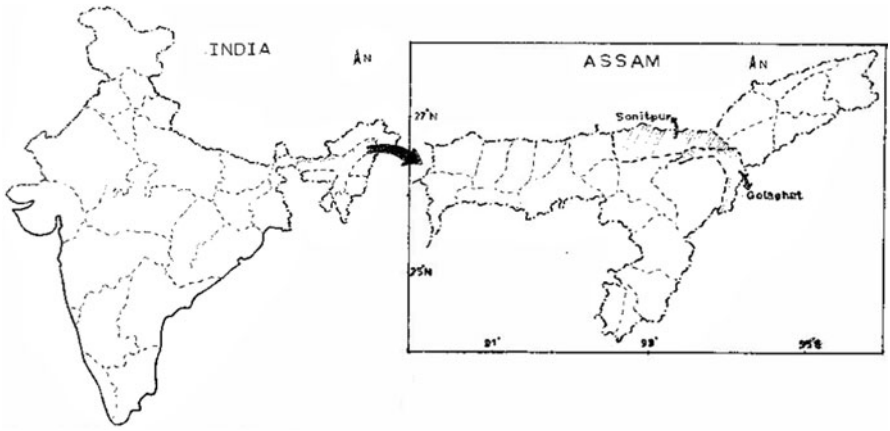

Fig. 1 Location of study area

namely Sonitpur and Golaghat (Fig. 1). Two village forests were selected from Sonitpur district (Madhupur and Deepa Basti in Charduar Reserved Forest) and the two from Golaghat district (Gamariguri and Kolaigaon in Doyang Reserved Forest). The encroached villages-Banduguri and Navajyoti-were selected from Sonitpur and Golaghat district respectively.

Sonitpur and Golaghat districts were selected as study areas because they have very high forest coverage and jointly cover almost 16.4 % of the total forest area in Assam (GOA 2010). The two districts were found to have three forest divisions within which there are 53 village forests and 17 reserved forests. These village forests are mostly inhibited by tribals, Adivasis[3] and Nepalese. Both districts are located near the border of Assam state, and are frequently disturbed by land disputes between indigenous people and immigrants. In 1990–1991, groups belonging to tribal communities in neighbouring states illegally entered reserved forests and commenced clearing forestland for settlement in a highly organized manner. In Sonitpur district, forests cover declined between 1990 and 2001 by about 28.6 %, which according to Indian Institute of Remote Sensing was the highest rate of deforestation anywhere in India (Shrivastava et al. 2002). The three most affected reserved forests in the district of Sonitpur were Naduar (90 % loss) followed by Bishwanath (70 % loss) and Charduar (60 % loss) (Kushwaha and Hazarika 2004). The situation was equally bad in Golaghat district where out of 1,037.9 km^2 of reserved forest only 167.9 km^2 (16.2 %) remains undisturbed. A huge loss of forest area in Doyang Reserved Forest in the Golaghat district was observed from satellite imagery (Sarma et al. 2008). The encroachers had formed societies and it would have been extremely difficult for the government to evict them (Bora 2001). As of 2005, of the 1.4 m ha of reserved forestland in Assam, 3.4 m ha has been encroached, 2.1 m ha of which had been encroached before 1980 (GOA 2008).

[3] Adivasis are those people who migrated from Orissa, Bihar and other states of India to Assam and engaged in tea gardens as labourers thereafter.

Research Method

The study utilized both primary and secondary data. Secondary data regarding geographical location and demographic pattern were collected from the office of chief conservator and other documents published by Government of Assam. Primary data were collected by multi-stage sampling. After selecting the two case study districts, four village forests and two villages created by encroachers were selected from reserved forests under the jurisdiction of these districts. Before going to the field to collect primary information, Focus Group Discussions (FGD) were conducted in every selected village in the presence of the village headman and forest officials. The FGDs were an important source of information about number of households and total population size, and whether villagers have been living in village forests for generations or had migrated. In each selected village, 10 % of total households were selected randomly. In Sonitpur district, 100 households from Charduar Reserved Forest were selected for interview, out of which 35 households were from Madhupur village forest, 25 households from Deepa Basti village forest and remaining 40 from Banduguri encroached village. Similarly, for Golaghat district, 90 households from Doyang Reserved Forest were selected out of which 55 households were from Gamariguri and Kolaigaon village forests and 35 households were from Navajyoti village inhabited by encroachers. Thus, altogether 190 households were interviewed from both these two districts. Interviews were conducted with household heads when available and otherwise with any other adult household member. The questionnaire, which comprised questions on demographic, economic and resource extraction pattern from forests, was translated into local languages for better understanding by respondents. Attitudes towards biodiversity conservation were assessed by questions on environmental issues including deforestation, loss of biodiversity and importance of biodiversity conservation. These questions were adopted from Ninan et al. (2007) with modifications to suit the type of study area. A new dimension added was the assessment of attitudes and perceptions towards biodiversity conservation in the context of *FRA 2006*. Before presenting these questions, respondents have been briefed about the issue of biodiversity conservation, its importance, links between loss of biodiversity and rural people's livelihood. They were also briefed about the pros and cons of *FRA 2006*.

The authors along with four data enumerators conducted interviews during April and May of 2010. About 1.5–2 h were spent in collecting primary information from each household. Out of these four data enumerators employed, two held a masters degree in economics and had been exposed to methodology and the terms used in the study. The other two data enumerators were locals but having some knowledge of the concept and benefits of biodiversity, and how to protect it. All four data enumerators were trained in the various aspects of the survey.

Data analysis was conducted using SPSS version 16.0. Eight variables were selected to study differences in attitudes of dwellers of village forests and encroachers towards biodiversity conservation, namely caste, occupation, sex, age, family size, total landholdings, educational qualification and source of fuel for cooking. Out of these eight variables, three variables-namely family size, age of

respondents and total landholding area were captured in absolute figure in the survey. Responses to these three variables were divided into two categories based on mean score (Wang et al. 2006). The variable 'family size' was divided into two categories—less than 5 and 5 or more (mean family size 4.9 persons). To capture age, respondents were divided into two classes, namely those less than 48 and 48 years or more in age (mean of respondent age 47.6 years). Also, total landholding area of respondents was divided into two classes—less than 9 ha and 9 ha or more (mean of landholdings 9.4 ha). Concerning educational qualification, a literate respondent was defined as one having at least one full year of schooling and illiteracy was defined as less than one full year (Shrivastava and Heinen 2007). Percentages and frequencies were calculated for each socio-economic and demographic characteristic. The Kruskal–Wallis test was used to check whether the differences in responses to attributes related to biodiversity conservation and environment were associated with these eight variables. ANOVA was used to compare the differences in variance among variables (e.g. differences in caste among different occupations), and the post-hoc Tukey LSD test was performed to check for differences in means within variables (e.g. differences in various classes of caste). The Friedman test was used to compare respondents' rankings of reasons for biodiversity conservation.

Results and Discussion

As shown in Table 1, the majority of the respondents were cultivators (90.7 % in encroached village and 80.9 % in village forests). The encroacher mainly produced rice, but typically also produced mustard, chilies and yam for both subsistence and sale. In both village-types, most respondents were male (above 90 %), due to the fact that almost all households were headed by males owing to the strong gender-biased structure prevailing in the study area. In some cases the head of the household was found to be female, but was found to be reluctant to be interviewed.

About 15.7 % of the respondents in village forests and 6.7 % of respondents in encroached villages earned their livelihood as labourers in other farmer's paddy fields because they did not have any land for cultivation. Some of them worked in tea gardens on a daily basis and some went to nearby towns to work as day labourers (Table 1). A few respondents in village forests (3.5 %) but none from encroached villages were engaged in service. The possible reason might be the presence of higher percentage of literate respondents in village forests in comparison to encroached villages. From the Chi-square (χ^2) value, it was found that the difference in occupation was statistically significant between different villages ($\chi^2 = 9.17$, $df = 3$, $p < 0.03$). Table 1 shows that village forests were mostly inhabited by general caste people whereas encroached villages were inhabited by schedule tribes (ST) and adivasi. This difference in caste of people was found to be statistically significant from the χ^2 values ($\chi^2 = 78.59$, $df = 4$, $p < 0.00$). Differences in caste were also found to be statistically significant among different occupations ($\chi^2 = 11.92$, $df = 4$, $p < 0.01$).

Table 1 Socio-economic and demographic characteristics of respondents according to village-type (in percentages)

Village-type	Caste					Occupation				Gender	
	General	OBC	SC	ST	Adivasi	Cultivator	Service	Business	Wage earner	Male	Female
Village forest	33.0	13.9	7.8	40.9	4.3	80.9	3.5	0	15.7	97.4	2.6
Encroached village	0.0	33.3	0.0	46.7	20.0	90.7	0	2.7	6.7	92.0	8.0

Village-type	Educational qualification		Age (in years)		Family size		Total landholdings(ha)		Source of fuel for cooking	
	Literate	Illiterate	Less than 48	48 or more	Less than 5	5 or more	Less than 9	9 or more	Fire wood	LPG
Village forest	60.9	39.1	58.3	41.7	46.1	53.9	52.2	47.8	86.1	13.9
Encroached village	49.3	50.7	52.0	48.0	44.0	56.0	34.7	65.3	100.0	0.0

Table 2 Responses of respondents towards environmental and biodiversity conservation issues (in percentages)

Importance class	Environmental issues	Biodiversity loss	Conservation of biodiversity at any cost
Important	87.9	66.3	57.4
Not important	0.5	3.7	4.7
Indifferent	11.6	30.0	37.9

In village forests, 86.1 % of the respondents used fuelwood for cooking. But in encroached villages, 100 % respondents revealed that they had been using firewood for cooking, this being one of the indications that encroachers were highly dependent on forests. Almost 65.3 % respondents in encroached villages had landholdings 9 ha or more where as 52.2 % of respondents in village forests had landholdings less than 9 ha (Table 1). The average value of land-holding size varied significantly between occupation types ($F_{3,186} = 3.93$, $p < 0.01$) and among different castes ($F_{4,185} = 6.25$, $p < 0.00$). The Tukey LSD test revealed that cultivator's size of land-holding differed significantly from wage earners ($p < 0.02$) but not from service workers and businessmen. The post-hoc LSD test also indicated that land-holding size of general caste people differed from schedule tribes (ST) ($p < 0.07$) but not from other backward class (OBC), schedule caste (SC) and adivasi.

Attitudes Towards Biodiversity Conservation

In terms of biodiversity conservation, it was found that 87.9 % of respondents felt that environmental issues were important, 11.6 % were indifferent to it while a negligible percentage expressed that environmental issues were not important (Table 2). Similarly, the issue of biodiversity loss and conservation of biodiversity at any cost were important for 66.3 and 57.4 % of respondents respectively. About 30.0 and 37.9 % were indifferent to the issue of biodiversity loss and conservation of biodiversity at any cost respectively whereas a negligible percentage of people did not consider these two issues as important. Therefore, it can be said that the majority of the respondents had positive attitudes towards environmental and biodiversity-related issues.

Size of family, gender and age of respondents were found to have no significant association with attitudes towards environmental issues, biodiversity loss and conservation of biodiversity at any cost (Table 3). However, village-type, occupation, caste, source of fuel for cooking, educational qualification and size of land-holding were found to be significantly associated with attitudes towards these attributes (Table 3).

The majority of the respondents believed that biodiversity had a right to survive. They also believed that if they did not preserve biodiversity then they would be deprived of expected future benefits (Table 4). When asked the reasons behind such high ranking of conserving biodiversity for the sake of future expected benefit, it

Table 3 Attitudes of respondents towards environmental and biodiversity conservation issues

Variable	Environmental issues			Biodiversity loss			Conservation of biodiversity at any cost		
	χ^2	*df*	Sig.	χ^2	*df*	Sig.	χ^2	*df*	Sig.
Village-type	6.91	1	.03	7.02	1	.03	2.39	1	.02
Caste	12.32	4	.01	37.88	4	.00	43.42	4	.00
Occupation	3.82	3	.03	15.43	3	.00	22.02	3	.00
Sex	1.29	1	.26	0.31	1	.58	0.40	1	.53
Educational qualification	19.59	1	.00	62.27	1	.00	41.77	1	.00
Age	1.25	1	.26	1.01	1	.31	.09	1	.76
Family size	.02	1	.89	.03	1	.90	1.21	1	.27
Total landholdings	5.43	1	.02	4.43	1	.04	7.90	1	.00
Source of fuel for cooking	3.17	1	.01	15.03	1	.00	12.75	1	.00

Table 4 Ranking of reasons for biodiversity conservation (in percentage)

Reasons	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
If we don't conserve today we shall not get expected benefit in future	32.1	30.0	25.3	10.0	2.6
Biodiversity has right to survive	31.6	30.0	28.9	8.4	1.1
For religious and cultural value	1.1	4.2	8.9	12.6	73.2
Important as a source of livelihood	20.0	7.9	7.4	45.3	19.4

was found that forest officials, tribal sangha[4] and nongovernmental organizations (NGOs) often used to come to their locality and explained to them the link between existence of forest and survival of mankind. The other reasons for biodiversity conservation were considered not to be so important by respondents. Use of the Friedman's test showed that rankings differed significantly across the reasons for biodiversity conservation ($\chi^2 = 529.39$, $df = 4$, $p < 0.00$).

The majority of respondents believed that *FRA 2006* would be helpful for biodiversity conservation in general and would protect their livelihood in particular (Table 5). When encroachers were asked about their opinion on *FRA 2006*, they revealed that this was an *Act* to give land patta[5] to forests-dwelling communities. The main reason behind this view was the teaching by their leader,[6] who asserted that the *FRA 2006* was merely an instrument to give land pattas. This belief might prove harmful in future. As a result, the people overlooked other important environmental and conservation issues of the *Act* such as conservation of forests and role of Gram Sabha's in biodiversity protection.

[4] Sangha means club or institution.

[5] Patta is a document, which gives legal ownership of land.

[6] It is not clear who they considered as a leader. Sometimes they referred to a leader as an influential man among themselves or sometimes to an agent of political parties.

Table 5 Responses of respondents towards afforestation, biodiversity conservation and livelihood linked with *FRA 2006* (in percentages)

Response	*FRA 2006* will help in afforestaton	*FRA 2006* will help in biodiversity conservation	*FRA 2006* will protect livelihood of villagers
Yes	50.0	50.0	93.2
No	9.5	8.9	0.5
Don't know	40.5	41.1	6.3

Table 6 Attitudes of respondents towards afforestation, biodiversity conservation and livelihood linked with *FRA 2006*

Variable	*FRA 2006* will help in afforestaton			*FRA 2006* will help in biodiversity conservation			*FRA 2006* will protect livelihood of villagers		
	χ^2	*df*	Sig.	χ^2	*df*	Sig.	χ^2	*df*	Sig.
Village-type	26.89	1	.00	43.19	1	.00	9.71	1	.00
Caste	24.78	4	.00	27.87	4	.00	15.93	4	.00
Occupation	3.29	3	.51	3.74	3	.44	4.29	3	.37
Sex	3.45	1	.23	4.12	1	.13	5.06	1	.09
Educational qualification	4.82	1	.03	8.53	1	.00	2.40	1	.02
Age	.91	1	.34	.95	1	.33	.63	1	.43
Family size	.26	1	.61	.73	1	.39	.88	1	.35
Total land holdings	9.33	1	.00	4.15	1	.04	5.09	1	.02
Source of fuel for cooking	4.04	1	.13	5.61	1	.06	1.20	1	.55

When the respondents were asked if *FRA 2006* would help in aforestation, 50 % respondents replied in the affirmative and 40.5 % respondents were unsure. A similar pattern of response was noticed on the second issue also (*FRA 2006* will help in protection of biodiversity loss). But surprisingly when respondents were asked if *FRA 2006* would protect livelihood, 93.2 % respondents replied positively. So it was necessary to examine what variables were associated with such a response pattern. Therefore, Chi square testing was applied to association among attitudes and characteristics of respondents. From Table 6, it was found that village-type, caste, educational qualification and size of land-holding had significant association with aforestation linked with *FRA 2006*. These same four variables were also found to be significantly associated with biodiversity conservation and livelihood conservation linked with *FRA 2006*.

As indicated in Table 6 village-type—whether it is a village forest or an encroached village—affected attitudes towards the three attributes regarding the *FRA 2006*. Similarly, variation in caste was important in determining differences in responses towards the *FRA 2006*. Besides these two variables, the respondents' educational status and land-holding size were important in explaining differences in attitudes towards those attributes. Interestingly, occupation of respondents, age,

family size and source of fuel for cooking were not found to be associated with any of these three kinds of attributes associated with *FRA 2006*.

Conclusions

The research findings support the hypothesis that forest-dependent communities in the study area have positive attitudes towards biodiversity conservation, and also indicate that they nurture favourable views of the *Forest Rights Act 2006*. Therefore, when introducing measures by government or any other organization to conserve biodiversity, these people should be convinced of the benefits of conservation. At the same time it has also been found that village-type, caste, educational qualification and size of land-holding influence their attitudes. Mere implementation of policy without taking into consideration differences in these characteristics may not always be successful in conservation of forests and biodiversity. Thus the government should take these differences into consideration while implementing any policy.

To conserve forest with the support of forest dependent communities, the Government of Assam has already introduced Joint Forest Management (JFM) in 90 out of the total of 499 village forests and in 460 revenue villages covering 57,341 households, in order to protect forests by involving the people residing within and near forests (GOA 2006). However, there has been lack of support from people for the JFM scheme because the scheme was found to ignore the issue of ownership of land and forest products. Contrary to the happenings in the JFM scheme, the present study shows that people have positive attitudes towards the *Forest Rights Act 2006* and persuasion of forest officials, tribal sangha as well as NGOs is also effective in maintaining such positive attitudes. In the light of the present findings, it is argued that an environmental education program may be used to encourage better implementation of such forest management schemes (Gillingham and Lee 1999). Most of the respondents believed that the *Forest Rights Act 2006* would protect livelihoods of villagers. Therefore, it can be argued that issues of land title through the *Forest Rights Act 2006* might be one aspect for active community participation for biodiversity conservation. Though it is essential to recognize the rights of forests-dwelling communities, it is also imperative for the rights-holders to monitor their own activity and its impact on forests areas. It is the duty of the rights-holders to ensure their activities are sustainable and assist the conservation program. In this respect, there is a need to encourage the various tribal bodies, forest department, NGOs and concerned people to collaborate with rights-holders to develop a monitoring system through which rights-holders can continuously monitor the impact of their use of forests (Bose 2009).

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